

CLAIMS

1. An elongate explosive charge element, said explosive charge element including a flexible frangible cutting sheet, said charge element adapted to the penetration of a barrier structure.
2. The charge element of claim 1 wherein said cutting sheet is comprised of a matrix of polymers including plasticisers, stabilizers and flexible agents, said matrix containing a substantially uniform distribution of powdered material.
3. The charge element of claim 1 wherein said powdered material is selected singly or in combination from a group of metals and ceramics, said group of metals including copper, aluminium, brass and ferrous metals.
4. The charge element of claim 2 wherein said cutting sheet is formed by an extrusion process.
5. The charge element of claim 2 wherein said cutting sheet is formed by a casting process.
6. The charge element of claim 1 wherein said cutting sheet is associated with an explosive agent.
7. The charge element of claim 6 wherein said explosive agent is in sheet form laminated to said cutting

sheet, the lamination comprising an explosive agent layer and a first cutting sheet layer.

5 8. The charge element of claim 7 wherein said lamination of said cutting sheet and said explosive agent layer are formed so as to produce a shaped charge effect when combined with a stand-off material; said charge effect having the general behavioral characteristics of the "Monroe Effect".

10 9. The charge element of claim 8 wherein said lamination of said first cutting sheet and said explosive agent layer is combined with a second layer of cutting sheet so as to substantially envelop said explosive agent layer and said first cutting sheet; said second layer acting as a tamping layer.

15 10. An elongate explosive charge element, said explosive charge element including a flexible frangible explosive cutting sheet, said charge element adapted to the penetration of a barrier structure.

20 11. The charge element of claim 10 wherein said explosive cutting sheet is comprised of a matrix of polymers including plasticisers, stabilizers and flexible agents, said matrix containing a substantially uniform distribution of powdered

material, said matrix further containing a distribution of explosive agent.

5 12. The charge element of claim 11 wherein said powdered material is selected singly or in combination from a group of metals and ceramics, said group of metals including copper, aluminium, brass and ferrous metals.

10 13. The charge element of claim 11 wherein said explosive cutting sheet is formed by an extrusion process.

14. The charge element of claim 11 wherein said explosive cutting sheet is formed by a casting process.

15 15. The charge element of claim 14 wherein said explosive cutting sheet is formed so as to produce a shaped charge effect when combined with a stand-off material; said charge effect having the general behavioral characteristics of the "Monroe Effect".

20 16. The charge element of claims 2 and 15 wherein said explosive cutting sheet and said stand-off material is combined with a layer of flexible frangible cutting sheet, said flexible frangible cutting sheet acting as a tamping layer.

17. The charge element of any of claims 1 to 16 wherein said charge element is provided with a metal liner.
18. The charge element of claim 17 wherein said metal liner is combined with laminations of said flexible frangible cutting sheet and said explosive agent; said metal liner acting as a penetrating agent; said cutting sheet acting as a tamping agent.
19. The charge element of claim 18 wherein said laminations of said cutting sheet, said explosive agent and said liner, when combined with a stand-off material act as a shaped charge with the behavioral characteristics of the "Monroe Effect".
20. The charge element of claim 17 wherein said metal liner is combined with laminations of said flexible frangible explosive cutting sheet; said metal liner acting as a penetrating agent; said explosive cutting sheet acting as a tamping agent.
21. A charge carrier adapted to support elongate explosive charge elements, said charge carrier adapted to the penetration of a masonry wall.
22. The charge carrier of claim 21 wherein said carrier is comprised of a frame having a generally rectangular perimeter and at least one cross member,

the members of said frame and cross member formed of hollow section polymeric material.

5 23. The charge carrier of claim 22 wherein said frame members have an outer face provided with a channel extending the length of said members; said channel adapted to accept said elongate explosive charge element as an insert.

10 24. The charge carrier of claim 23 wherein said frame perimeter and said cross member form a sealed container adapted for the retention of a tamping fluid; said sealed container provided with apertures and closure means for the filling of said tamping fluid.

15 25. The charge carrier of claim 24 wherein the internal surfaces of said sealed container are pre-coated with a gelling agent adapted to modify said tamping fluid into a tamping gel when said fluid is added to said container.

20 26. The charge carrier of claim 25 wherein said frame is provided with foot elements adapted to provide a height adjustment facility to said perimeter frame.

27. The charge carrier of claim 26 wherein said frame is provided with an adjustable hinged support brace,

said brace attaching to the rear face of a cross member.

28. The charge carrier of claim 27 wherein said frame is provided with a plurality of charge ports on the rear face of said frame members.

29. The charge carrier of claim 21 wherein said elongate explosive charge element is a composite layered and shaped assembly of flexible frangible cutting sheet and an explosive agent.

30. The charge carrier of claim 21 wherein said elongate explosive charge element is a composite layered and shaped assembly of flexible frangible explosive cutting sheet and an explosive agent.

31. The charge carrier of claim 29 and claim 30 wherein said explosive charge element includes a shaped metal liner.

32. A charge carrier adapted to support an elongate explosive charge element adapted to effect a directed explosive charge for the penetration of a barrier in which the penetrating agent is a fluid.

33. The charge carrier of claim 32 wherein said barrier is comprised of structures including domestic and commercial metal roller doors, metal doors, fire doors, reinforced timber doors and glass doors.

34. The charge carrier of claim 32 wherein said carrier is comprised of an elongate body of hollow section polymeric material.

5 35. The charge carrier of claim 34 wherein said elongate body is provided with a sealing end cap at a first end and filler end cap at a second end.

10 36. The charge carrier of claim 35 wherein said filler end cap is provided with an aperture and closure means adapted to allow the filling of said body with a tamping fluid.

37. The charge carrier of claim 36 wherein said filler end cap is provided with a detonating cord grommet.

15 38. the charge carrier of claim 37 wherein the internal walls of said body are pre-coated with a gelling agent adapted to modify said tamping fluid into a tamping gel when said fluid is added to said body.

20 39. The charge carrier of claim 38 wherein said elongate body is provided with an adjustable foot element adapted to provide a height adjustment facility to said body.

40. The charge carrier of claim 39 wherein said elongate body is provided with an adjustable hinged brace.

41. The charge carrier of claim 40 wherein said body is provided with flexible magnetic strips disposed

along portions of the front face of said body, said strips adapted to attach said charge carrier to a ferrous metal surface.

5 42. The charge carrier of claim 41 wherein said elongate body is provided with internal guide rails adapted to accept a loading card as a friction sliding fit.

10 43. The charge carrier of claim 42 wherein said loading card is an elongate polymeric extrusion having front and rear wall elements separated by transverse dividing elements so as to form a number of longitudinal passages through the length of said card.

15 44. The charge carrier of claim 43 in which said loading card is provided with a series of slots and holes disposed at each end of said card adapted to accept and retain a winding of detonating cord laid along the front face of said card so as to form an explosive charge element.

20 45. The charge carrier of claim 44 wherein said explosive charge element is combined with a flexible frangible cutting sheet.

46. The charge carrier of claim 45 wherein said explosive charge element comprises a frangible

cutting sheet, the matrix of said cutting sheet containing a distributed explosive agent.

47. A method for the penetration of a barrier structure, said method including the steps of,

5 a. forming a flexible frangible cutting sheet by a process of extruding or casting in a suitable mould, a mixture of polymers including plasticisers, stabilizers, flexible agents and powdered metal or ceramics,

10 b. shaping said cutting sheet in combination with a layer of explosive agent and a stand-off material to form an elongate explosive charge element,

15 c. placing said explosive charge element in contact with said barrier structure and detonating said explosive charge element.

48. A method for the penetration of a barrier structure, said method including the steps of.

20 a. forming a flexible frangible explosive cutting sheet by a process of extruding or casting in a suitable mould, a mixture of polymers including plasticisers, stabilizers and flexible agents, powdered metal or ceramics and an explosive agent,

- b. shaping said explosive cutting sheet and combining said sheet with a stand-off material to form an elongate explosive charge element,
- c. placing said explosive charge element in contact with said barrier structure and detonating said explosive charge element.

49. A method for the penetration of a barrier structure using a charge carrier, said method including the steps of,

- a. installing an elongate explosive charge element in said charge carrier,
- b. filling said charge carrier with a tamping agent,
- c. placing said charge carrier in contact with said barrier structure and detonating said explosive charge element.

50. A flexible linear charge system comprising elongate elements; said elements including a malleable explosive charge element, a liner and a stand-off member enveloped in a flexible elongate inertial mass carapace.

51. The flexible linear charge system of claim 49 wherein said malleable explosive charge element is comprised of flexible sheet explosive shaped so as to produce jetting of said liner when detonated.

52. The flexible linear charge system of claim 50 wherein said jetting produces a "Monroe Effect".

53. The flexible linear charge system of any one of claims 49 to 51 wherein said liner is a composite of an extruded matrix containing a dense distribution of solid particulate matter.

54. The flexible linear charge system of claim 52 wherein said solid particulate matter is a dense metal carbide.

55. The flexible linear charge system of claim 52 wherein said solid particulate matter is any plasticized metal.

56. The flexible linear charge system of any one of claims 49 to 54 wherein said stand-off member is comprised of closed-cell plastic foam.

57. The flexible linear charge system of any one of claims 49 to 54 wherein said stand-off member is comprised of an extruded polymeric tube.

58. The flexible linear charge system of any one of claims 49 to 56 wherein said inertial mass carapace is comprised of an extruded compound of a metallic powder and plasticizer.

59. The flexible linear charge system of any one of claims 49 to 57 wherein said inertial mass carapace

is adapted to substantially envelop said elongate elements leaving at least an exposed portion along that side of said stand-off member opposite said explosive charge element.

5 60. The flexible linear charge system of any one of claims 49 to 58 wherein said inertial mass carapace is formed with flat surfaces adjoining each side of said at least an exposed portion; said flat surfaces provided with attachment means for
10 attachment to a surface to which said linear charge system is to be applied.

61. The flexible linear charge system of claim 59 wherein said attachment means are self-adhesive strips.

15 62. The flexible linear charge system of claim 59 wherein said attachment means are magnetic strips attached to said flat surfaces.

20 63. The flexible linear charge system of any one of claims 56 to 61 wherein bungs are adapted to close off open ends of said extruded polymeric tube so as to allow retention of a fluid therein.

64. The flexible linear charge system of claim 62 wherein at least one of said bungs is provided with

one-way valve means adapted to the passage of said fluid into said extruded polymeric tube.

65. The flexible linear charge system of claim 62 or 63 wherein said fluid is a pressurized gas.

5 66. A flexible linear charge element comprising an extruded closed cell carcass provided with a central aperture; said carcass having an upper arcuate surface and a lower flat surface and laterally extending flange portions; said arcuate surface overlaid by a first layer composed of a frangible
10 liner material.

67. The flexible linear charge element of claim 65 wherein said first layer is overlaid by a second layer comprising an explosive sheet.

15 68. The flexible linear charge element of claim 66 wherein said first layer is overlaid by a second layer comprising an inertial mass carapace.

69. The flexible linear charge element of claim 65 wherein said flat surface is provided with an
20 adhesive layer.

70. A linear charge carrier element comprising a length of a section of plastic tube having an outer surface to which is affixed an inner surface of a first layer comprising explosive sheet material and

wherein a second layer of suitable fibrous material is affixed to an outer surface of said explosive sheet material so as to form a backing.

5 71. The linear charge carrier element of claim 69 wherein said fibrous material is cardboard.

72. The flexible linear charge system as herein described and with reference to the accompanying drawings.

AMENDED CLAIMS

[(received by the International Bureau on 25 April 2004 (25.04.04);
original claims 1-72 replaced by new claims 1-73 (14 pages)]

1. An elongate explosive charge element, said explosive charge element including a flexible frangible cutting sheet formed of a flexible matrix containing a metal or ceramic powder; said charge element adapted to the penetration of a barrier structure.
2. The charge element of claim 1 wherein said cutting sheet is comprised of a matrix of polymers including plasticisers, stabilizers and flexible agents, said matrix containing a substantially uniform distribution of powdered material.
3. The charge element of claim 1 wherein said powdered material is selected singly or in combination from a group of metals and ceramics, said group of metals including copper, aluminium, brass and ferrous metals.
4. The charge element of claim 2 wherein said cutting sheet is formed by an extrusion process.
5. The charge element of claim 2 wherein said cutting sheet is formed by a casting process.
6. The charge element of claim 1 wherein said cutting sheet is associated with an explosive agent.
7. The charge element of claim 6 wherein said explosive agent is in sheet form laminated to said cutting

sheet, the lamination comprising an explosive agent layer and a first cutting sheet layer.

8. The charge element of claim 7 wherein said lamination of said cutting sheet and said explosive agent layer are formed so as to produce a shaped charge effect when combined with a stand-off material; said charge effect having the general behavioral characteristics of the "Monroe Effect".
9. The charge element of claim 8 wherein said lamination of said first cutting sheet and said explosive agent layer is combined with a second layer of cutting sheet so as to substantially envelop said explosive agent layer and said first cutting sheet; said second layer acting as a tamping layer.
10. An elongate explosive charge element, said explosive charge element including a flexible frangible explosive cutting sheet, said charge element adapted to the penetration of a barrier structure.
11. The charge element of claim 10 wherein said explosive cutting sheet is comprised of a matrix of polymers including plasticisers, stabilizers and flexible agents, said matrix containing a substantially uniform distribution of powdered

material, said matrix further containing a distribution of explosive agent.

12. The charge element of claim 11 wherein said powdered material is selected singly or in combination from a group of metals and ceramics, said group of metals including copper, aluminium, brass and ferrous metals.
13. The charge element of claim 11 wherein said explosive cutting sheet is formed by an extrusion process.
14. The charge element of claim 11 wherein said explosive cutting sheet is formed by a casting process.
15. The charge element of claim 14 wherein said explosive cutting sheet is formed so as to produce a shaped charge effect when combined with a stand-off material; said charge effect having the general behavioral characteristics of the "Monroe Effect".
16. The charge element of claims 2 and 15 wherein said explosive cutting sheet and said stand-off material is combined with a layer of flexible frangible cutting sheet, said flexible frangible cutting sheet acting as a tamping layer.

17. The charge element of any of claims 1 to 16 wherein said charge element is provided with a metal liner.
18. The charge element of claim 17 wherein said metal liner is combined with laminations of said flexible frangible cutting sheet and said explosive agent; said metal liner acting a penetrating agent; said cutting sheet acting as a tamping agent.
19. The charge element of claim 18 wherein said laminations of said cutting sheet, said explosive agent and said liner, when combined with a stand-off material act as a shaped charge with the behavioral characteristics of the "Monroe Effect".
20. The charge element of claim 17 wherein said metal liner is combined with laminations of said flexible frangible explosive cutting sheet; said metal liner acting as a penetrating agent; said explosive cutting sheet acting as a tamping agent.
21. A charge carrier adapted to support elongate explosive charge elements, said charge carrier comprised of at least one hollow section polymeric member.
22. The charge carrier of claim 21 wherein said carrier comprises a frame having a generally rectangular perimeter and at least one cross member, members of

said frame and said cross member formed of hollow section polymeric material.

23. The charge carrier of claim 22 wherein members of said frame and said cross member have an outer face provided with a channel extending the length of said members; said channel adapted to accept said elongate explosive charge element as an insert.
24. The charge carrier of claim 23 wherein said frame perimeter and said cross member form a sealed container adapted for the retention of a tamping fluid; said sealed container provided with apertures and closure means for the filling of said tamping fluid.
25. The charge carrier of claim 24 wherein the internal surfaces of said sealed container are pre-coated with a gelling agent adapted to modify said tamping fluid into a tamping gel when said fluid is added to said container.
26. The charge carrier of claim 25 wherein said frame is provided with foot elements adapted to provide a height adjustment facility to said perimeter frame.
27. The charge carrier of claim 26 wherein said frame is provided with an adjustable hinged support brace,

said brace attaching to the rear face of a cross member.

28. The charge carrier of claim 27 wherein said frame is provided with a plurality of charge ports on the rear face of said frame members.
29. The charge carrier of claim 21 wherein said elongate explosive charge element is a composite layered and shaped assembly of flexible frangible cutting sheet and an explosive agent.
30. The charge carrier of claim 21 wherein said elongate explosive charge element is a composite layered and shaped assembly of flexible frangible explosive cutting sheet and an explosive agent.
31. The charge carrier of claim 29 and claim 30 wherein said explosive charge element includes a shaped metal liner.
32. A charge carrier adapted to support an elongate explosive charge element adapted to effect a directed explosive charge for the penetration of a barrier in which the penetrating agent is a fluid.
33. The charge carrier of claim 32 wherein said barrier is comprised of structures including domestic and commercial metal roller doors, metal doors, fire doors, reinforced timber doors and glass doors.

34. The charge carrier of claim 32 wherein said carrier is comprised of an elongate body of hollow section polymeric material.
35. The charge carrier of claim 34 wherein said elongate body is provided with a sealing end cap at a first end and filler end cap at a second end.
36. The charge carrier of claim 35 wherein said filler end cap is provided with an aperture and closure means adapted to allow the filling of said body with a tamping fluid.
37. The charge carrier of claim 36 wherein said filler end cap is provided with a detonating cord grommet.
38. the charge carrier of claim 37 wherein the internal walls of said body are pre-coated with a gelling agent adapted to modify said tamping fluid into a tamping gel when said fluid is added to said body.
39. The charge carrier of claim 38 wherein said elongate body is provided with an adjustable foot element adapted to provide a height adjustment facility to said body.
40. The charge carrier of claim 39 wherein said elongate body is provided with an adjustable hinged brace.
41. The charge carrier of claim 40 wherein said body is provided with flexible magnetic strips disposed

along portions of the front face of said body, said strips adapted to attach said charge carrier to a ferrous metal surface.

42. The charge carrier of claim 41 wherein said elongate body is provided with internal guide rails adapted to accept a loading card as a friction sliding fit.
43. The charge carrier of claim 42 wherein said loading card is an elongate polymeric extrusion having front and rear wall elements separated by transverse dividing elements so as to form a number of longitudinal passages through the length of said card.
44. The charge carrier of claim 43 in which said loading card is provided with a series of slots and holes disposed at each end of said card adapted to accept and retain a winding of detonating cord laid along the front face of said card so as to form an explosive charge element.
45. The charge carrier of claim 44 wherein said explosive charge element is combined with a flexible frangible cutting sheet.
46. The charge carrier of claim 45 wherein said explosive charge element comprises a frangible

cutting sheet, the matrix of said cutting sheet containing a distributed explosive agent.

47. A method for the penetration of a barrier structure, said method including the steps of,
- a. forming a flexible frangible cutting sheet by a process of extruding or casting in a suitable mould, a mixture of polymers including plasticisers, stabilizers, flexible agents and powdered metal or ceramics,
 - b. shaping said cutting sheet in combination with a layer of explosive agent and a stand-off material to form an elongate explosive charge element,
 - c. placing said explosive charge element in contact with said barrier structure and detonating said explosive charge element.
48. A method for the penetration of a barrier structure, said method including the steps of.
- a. forming a flexible frangible explosive cutting sheet by a process of extruding or casting in a suitable mould, a mixture of polymers including plasticisers, stabilizers and flexible agents, powdered metal or ceramics and an explosive agent,

- b. shaping said explosive cutting sheet and combining said sheet with a stand-off material to form an elongate explosive charge element,
 - c. placing said explosive charge element in contact with said barrier structure and detonating said explosive charge element.
49. A method for the penetration of a barrier structure using a charge carrier comprising at least one hollow section, said method including the steps of,
- a. installing an elongate explosive charge element in said charge carrier,
 - b. filling said charge carrier with a tamping agent,
 - c. placing said charge carrier in contact with said barrier structure and detonating said explosive charge element.
50. A flexible linear charge system comprising elongate elements; said elements including a malleable explosive charge element, a liner and a stand-off member enveloped in a flexible elongate inertial mass carapace comprised of an extruded compound of metallic or ceramic powder and plasticizer.
51. The flexible linear charge system of claim 49 wherein said malleable explosive charge element is

- comprised of flexible sheet explosive shaped so as to produce jetting of said liner when detonated.
52. The flexible linear charge system of claim 50 wherein said jetting produces a "Monroe Effect".
53. The flexible linear charge system of any one of claims 49 to 51 wherein said liner is a composite of an extruded matrix containing a dense distribution of solid particulate matter.
54. The flexible linear charge system of claim 52 wherein said solid particulate matter is a dense metal carbide.
55. The flexible linear charge system of claim 52 wherein said solid particulate matter is any plasticized metal.
56. The flexible linear charge system of any one of claims 49 to 54 wherein said stand-off member is comprised of closed-cell plastic foam.
57. The flexible linear charge system of any one of claims 49 to 54 wherein said stand-off member is comprised of an extruded polymeric tube.
58. The flexible linear charge system of any one of claims 49 to 57 wherein said inertial mass carapace is adapted to substantially envelop said elongate elements leaving at least an exposed portion along

that side of said stand-off member opposite said explosive charge element.

59. The flexible linear charge system of any one of claims 49 to 58 wherein said inertial mass carapace is formed with flat surfaces adjoining each side of said at least an exposed portion; said flat surfaces provided with attachment means for attachment to a surface to which said linear charge system is to be applied.
60. The flexible linear charge system of claim 59 wherein said attachment means are self-adhesive strips.
61. The flexible linear charge system of claim 59 wherein said attachment means are magnetic strips attached to said flat surfaces.
62. The flexible linear charge system of any one of claims 56 to 61 wherein bungs are adapted to close off open ends of said extruded polymeric tube so as to allow retention of a fluid therein.
63. The flexible linear charge system of claim 62 wherein at least one of said bungs is provided with one-way valve means adapted to the passage of said fluid into said extruded polymeric tube.

64. The flexible linear charge system of claim 62 or 63 wherein said fluid is a pressurized gas.
65. A flexible linear charge element comprising an extruded closed cell carcass provided with a central aperture; said carcass having an upper arcuate surface and a lower flat surface and laterally extending flange portions; said arcuate surface overlaid by a first layer composed of a frangible liner material.
66. The flexible linear charge element of claim 65 wherein said first layer is overlaid by a second layer comprising an explosive sheet.
67. The flexible linear charge element of claim 66 wherein said first layer is overlaid by a second layer comprising an inertial mass carapace.
68. The flexible linear charge element of claim 65 wherein said flat surface is provided with an adhesive layer.
69. A linear charge carrier element comprising a length of a section of plastic tube having an outer surface to which is affixed an inner surface of a first layer comprising explosive sheet material and wherein a second layer of suitable fibrous material

is affixed to an outer surface of said explosive sheet material so as to form a backing.

70. The linear charge carrier element of claim 69 wherein said fibrous material is cardboard.
71. The flexible linear charge system as herein described and with reference to the accompanying drawings.
72. A flexible inertial mass carapace for substantially enclosing elongate shaped charge elements; said carapace formed of an extruded matrix of metallic or ceramic powder and plasticizers.
73. A linear charge system comprising a sealed container element and an explosive charge element adapted for use of a fluid as a penetrating agent.

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